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Annual Performance Report for

EVALUATION OF INTERIOR ALASKA WATERS AND SPORT FISH
WITH EMPHASIS ON MANAGED WATERS - DELTA DISTRICT

by

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RESEARCH PROJECT SEGMENT

State: ALASKA Name: Lake and Stream Investigations
Project No.: F-9-12
Study No.: G-III Study Title: Lake and Stream Investigations
Job No.: G-III-I Job Title: Evaluation of Interior Alaska
Waters and Sport Fish with
Emphasis on Managed Waters -
Delta District

Period Covered: July 1, 1979 to June 30, 1980

ABSTRACT

Sixteen lakes stocked with rainbow trout, Salmo gairdneri Richardson, coho salmon, Oncorhynchus kisutch (Walbaum), and Arctic grayling, Thymallus arcticus (Pallas), were sampled with gill nets to provide data on survival and growth. Factors affecting survival and growth such as stocking densities, size of fish stocked, and strains of fish are discussed.

Estimates of angler use and sport harvest were made on Quartz Lake, George Lake, and the spring grayling fishery on the Tanana River. The Quartz Lake estimates utilized a stratified random sampling schedule to determine pressure. Estimated pressure for the summer season was 24,024 angler hours and an estimated 33,393 coho salmon were harvested from May 12 to September 3. Estimated total angler days at George Lake was 673 and total northern pike, Esox lucius Linnaeus, harvest was 1,558. An estimated total of 1,029 angler hours of effort was expended on the Tanana River during a 15 day period in April. Total estimated harvest of grayling and round whitefish, Prosopium cylindroceum (Pallas), for this period was 309 and 134, respectively. Age and length data for fish harvested are presented.

Sampling of the grayling populations in the upper 54 miles of the Eisenmenger Fork and North Fork of the Goodpaster River was conducted in June. Grayling age and length comparisons are made with samples from 1973. Age VII grayling were predominant.

Surveys conducted on Shaw Creek and two tributaries, Rapids Creek and Caribou Creek, provided information on spawning locations and timing, species composition of fish utilizing the tributaries, seasonal movements, and age and length of grayling. Eight species of fish were captured in a downstream weir operated on Caribou Creek in mid-September. Age and length data are presented for 150 grayling captured by weir and hook and line.

A summary of survey data for nine remote area lakes located south of Northway is presented.

BACKGROUND

The recreational fisheries in the upper Tanana River drainage generally fall into three categories: streams, lakes with indigenous fish species, and stocked lakes. Table 1 lists common and scientific names of all fish species mentioned in the report.

The principal fish species of recreational importance in area streams are Arctic grayling and round whitefish. Burbot are widely distributed in the larger glacial rivers and near the confluences of many tributary streams.

Lakes at lower elevations (generally below 2,200 ft) that connect to a river system usually contain populations of northern pike, burbot, least cisco, and humpback whitefish, while lakes at higher elevations support populations of lake trout, grayling, round whitefish, and burbot.

Landlocked lakes are typically barren. Since statehood most lakes near the highway system have been surveyed and several that were found to contain undesirable fish populations have been chemically rehabilitated. Many capable of supporting fish have been stocked with rainbow trout or silver salmon. A few have been stocked with Arctic grayling. Various stocking rates, sizes, strains, and timing have been tested to determine the limits which provide optimum survival and growth of stocked fish.

Research and management of selected waters are directed at monitoring fish population levels and angler utilization. The locations of waters within the study area, with the exception of lakes surveyed south of Northway, are shown in Figure 1.

RECOMMENDATIONS

1. Evaluations of survival and growth of stocked rainbow trout, coho salmon, and grayling in selected waters should continue with emphasis on evaluating rainbow trout from the Alaska Swanson source.
2. Angler use and sport fish harvest estimates on Quartz Lake and George Lake should continue and efforts to monitor fall grayling harvest on Shaw Creek should be expanded.
3. Mining activities in the Fortymile River drainage should be investigated and water quality and fish populations monitored.
4. Efforts should be made to secure public access sites along the Tanana River between Delta and Tok to provide launching sites and riverboat access to waters in the area.

OBJECTIVES

1. To evaluate stocking policies for rainbow trout and coho salmon and formulate stocking recommendations for optimum survival and growth.

Table 1. List of common names, scientific names and abbreviations.

Common Name	Scientific Name & Author	Abbreviation
Arctic grayling	<u>Thymallus arcticus</u> (Pallas)	GR
Burbot	<u>Lota lota</u> (Linnaeus)	BB
Coho salmon	<u>Oncorhynchus kistuch</u> (Walbaum)	SS
Humpback whitefish	<u>Coregonus pidschian</u> (Gmelin)	HWF
Lake chub	<u>Covesius plumbeus</u> (Agassiz)	LC
Lake trout	<u>Salvelinus namaycush</u> (Walbaum)	LT
Least cisco	<u>Coregonus sardinella</u> Valenciennes	LCI
Longnose sucker	<u>Catostomus catostomus</u> (Forster)	LNS
Northern pike	<u>Esox lucius</u> Linnaeus	NP
Rainbow trout	<u>Salmo gairdneri</u> Richardson	RT
Round whitefish	<u>Prosopium cylindraceum</u> (Pallas)	RWF
Slimy sculpin	<u>Cottus cognatus</u> Richardson	SSC

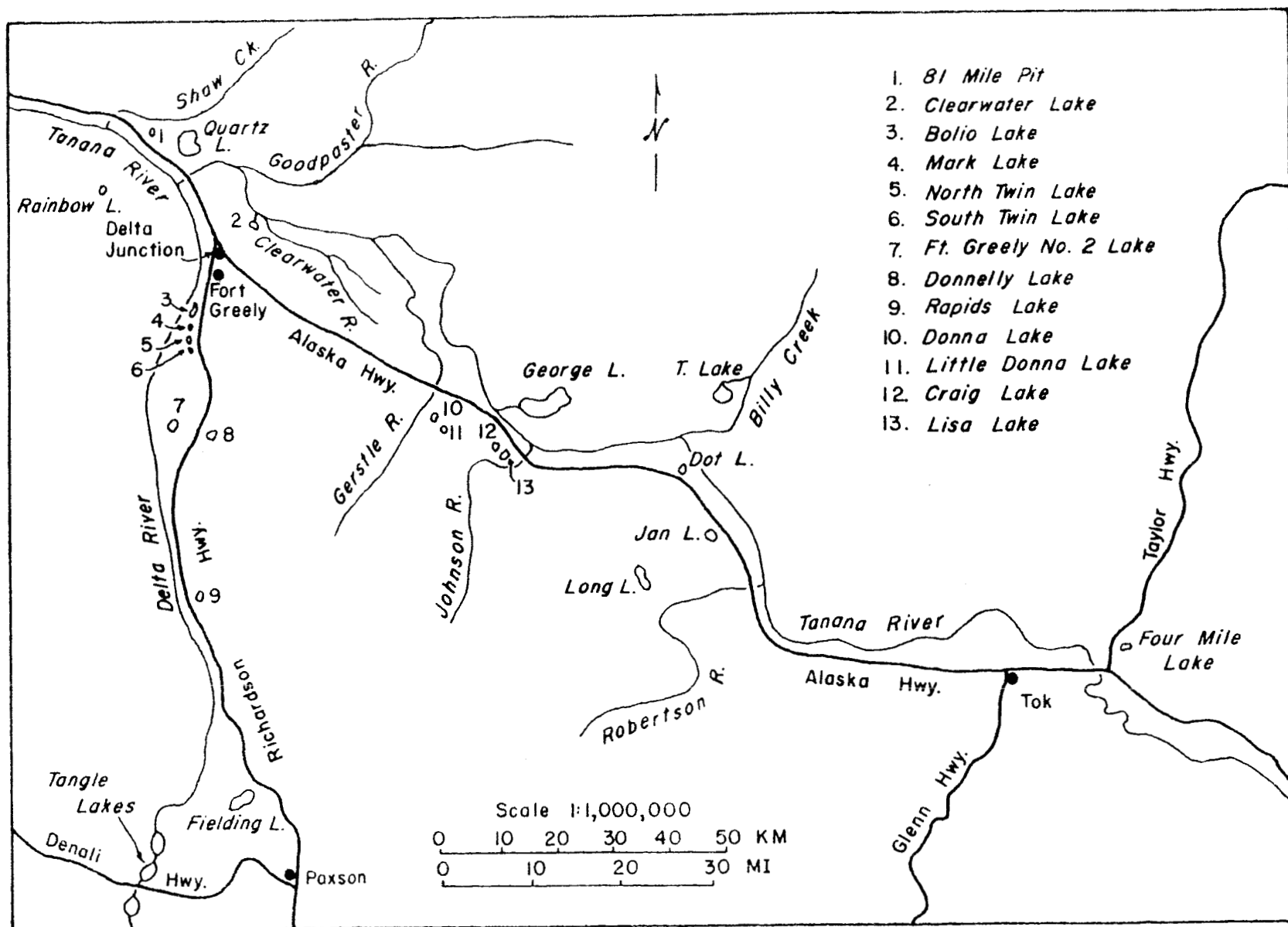


Figure 1. Location of waters in the Delta District.

2. To obtain estimates of existing or potential angler use and sport fish harvest on Quartz Lake, George Lake, and other high use waters.
3. Monitor existing fish stocks in Shaw Creek to determine changes in population structure.
4. To assist as required in the investigation of public access status to the area's recreational fishery waters.

TECHNIQUES USED

Graduated mesh monofilament gill nets, 125 ft x 6 ft with five mesh sizes ranging from 1/2 in to 2-1/2 in bar measure, were used to sample fish populations in lakes.

Fish were measured to fork length in millimeters. Fish scales used for age determination were cleaned, mounted on gummed cards, then impressed on 20 mil acetate using a heated press at 35,000 psi for 20 seconds. A Bruning 200 microfiche reader was used to read the scales.

Water samples were collected using a Kemmerer water sampler, and chemical analysis was done with a Hach model AL-36-WR kit. Lake depths were determined with a Lowrance echo sounder. Lake acreages were measured from 1:63,360 scale U.S.G.S. maps using a compensating polar planimeter.

FINDINGS

Fish Stocking Evaluations

Fish population sampling was conducted on 16 lakes stocked with rainbow trout, coho salmon, and Arctic grayling from August 10 to October 12, 1979, for evaluation of growth and survival of stocked fish. Most of the lakes were sampled with two gill nets fished overnight for 20 to 25 hours. Quartz Lake was sampled with three gill nets while Rapids, 81 mile, and Fourmile Lakes were netted with one gill net. Netting results, population characteristics and stocking histories are summarized in Table 2.

A hatchery shortage of rainbow trout for the past four years has forced a reduction in numbers of lakes scheduled for stocking and in the number of fish stocked in individual waters. No rainbow trout were available for stocking during 1978.

Coho salmon were stocked in Donnelly, Mark, Quartz, Lisa, North Twin, and South Twin Lakes in 1978. These fish were from the Seward Lagoon source. Age 1 coho salmon netted from the six lakes had a length range of 204-230 mm and a mean length of 215 mm. In comparison, Age 1 coho salmon from sources other than Seward Lagoon, sampled from 11 lakes in prior years had a length range of 132-187 mm with a mean of 157 mm. Stocking rates were comparable.

Table 2. Population characteristics of stocked lakes determined by graduated mesh gill nets, Interior Alaska, 1979.

Lake	Date Sampled	Species	No.	Age Class	Length (mm)		Frequency	Date Stocked	Total No.	No. /lb.	No. /lb.	Source
					Range	Mean						
Big	8/13	GR	1	I	198-250	232	0.58	6/22/78	50,000	fry	625	Tolsona
Craig	9/7	LC	1				0.02					
Donna	8/23	SS	5	III	205-242	225	0.11	8/24/76	23,100	174	398	Bear Lake
Little Donna	8/23	RT	3	V	470-502	490	0.06	7/23/74	116,000	279	339	Winthrop
Donnelly	10/12	SS	1	I	230		0.02	8/15/78	110,078	145	186	Seward Lagoon
Ft. Greely #2	10/12	RT	8	V	239-302	280	0.17	7/10/74	10,000	588	1,250	Winthrop
Jan	9/7	RT	2	III	464-532	499	0.05	8/02/76	10,000	670	227	Oregon
Janell	8/10	GR	4	I	217-244	234	0.33	8/10/78	440	45	44	Tolsona
Lisa	9/7	RT	3	III	397-418	409	0.08	8/02/76	10,000	670	200	Oregon
		SS	15	I	196-238	215	0.38	8/15/79	15,000	145	300	Seward Lagoon
Mark	8/31	SS	15	I	182-241	211	0.30	8/15/78	4,000	68	200	Seward Lagoon
North Twin	8/31	RT	2	IV	382-396	389	0.40	7/24/75	15,000	171	652	Ennis
		SS	40	I	190-264	209	0.80	8/15/78	6,000	145	260	Seward Lagoon
		SSc	18				0.36					
South Twin	8/31	SS	11	I	184-225	204	0.22	8/15/78	6,000	68	286	Seward Lagoon
Quartz	9/13	RT	3	II	338-442	381	0.05	7/26/77	113,800	11-304	76	Alaska Ennis
		RT	3	III	452-470	462	0.05	8/24/76	97,800	100-670	65	Oregon
		SS	5	I	208-232	221	0.08	8/17/76	55,549	129	37	Seward Lagoon
		SS	24	II	233-332	275	0.40	6/28-8/15/77	197,400	170-394	130	Seward Lagoon
Rapids	8/14	RT	3	II	262-295	273	0.14	*				
		RT	2	IV	315-326	321	0.09	7/25/75	2,000	272	400	Ennis
81-Mile Pit	10/12	GR	9	II	217-246	233	0.53	6/21/77	5,000	fry	5,000	Tolsona
4-Mile	8/2	RT	9	II	273-343	301	0.38**	6/14/77	24,800	95	248	Winthrop

* Not stocked - natural recruitment

** This lake was netted with a 2 1/2 inch bar mesh gill net rather than an experimental, for the purpose of sampling the sheefish population.

Catch per net hour for Age I coho salmon ranged from 0.22-0.80 in four of the lakes sampled in 1979. The catch in Quartz Lake of Age I coho salmon was only 0.08, however, the stocking rate for that age class was only 37 fish per acre. Age II coho salmon from the Seward Lagoon source, stocked at a rate of 130 fish per acre in Quartz Lake, were netted at a rate of 0.40 fish per hour even though heavy sport harvest occurred in the past two seasons.

Only six rainbow trout representing two year classes were netted in Quartz Lake. Three Age II rainbow trout from the Alaska-Ennis source ranged from 338-442 mm with a mean of 381 mm, and three Age III rainbow trout from the Oregon source ranged from 452-470 mm with a mean of 462 mm. Stocking densities were low for both year classes at 76 and 65 fish per acre.

Nine Age II rainbow trout of the Winthrop strain were netted from Fourmile Lake. Length range was 273-343 mm and mean length was 301 mm.

Evidence of natural recruitment of rainbow trout was again found in Rapids Lake with the netting of three Age II fish having a mean length of 273 mm. Five Age I rainbow trout having a mean length of 183 mm were netted in 1978. No fish have been stocked in the lake since 1975.

Age I grayling were sampled from two lakes in 1979. Age I grayling sampled from Big Lake 14 months after stocking as fry in June 1978 had a mean length of 232 mm. These fish survived a low dissolved oxygen level of 0.2 ppm recorded on January 17, 1979.

Grayling stocked in Janell Lake were pond reared fish which were first planted as fry in a rearing pond on Ft. Greely in June 1978. In August 1978, fingerlings averaging 45 per pound were seined and transplanted into Janell Lake. In August 1979, after 1 year in the lake, four Age I grayling sampled had a mean length of 234 mm.

Janell Lake is located on Macomb Plateau, east of the Johnson River, at an elevation of 3,950 ft near the headwaters of Dry Creek. Two small inlets entering the lake should provide suitable habitat for natural reproduction.

Age II grayling having a mean length of 233 mm were netted in 81-Mile Pit. The mean length of Age II grayling is the same as Age I grayling in the two lakes previously mentioned; however, the gravel pit is only one acre in size and was stocked at a much higher density than the other lakes.

Angler Pressure and Sport Fish Harvest Estimates

Quartz Lake:

Quartz is a 1,500 acre lake located near the Richardson Highway, approximately 16 miles north of Delta Junction. The lake was rehabilitated in 1970 with powdered rotenone to eliminate stunted northern pike and least cisco. Rainbow trout have been stocked annually since rehabilitation except 1978 when none were available. Coho salmon were stocked in 1977, 1978 and 1979 due to a shortage of rainbow trout.

A stratified random sampling schedule was used to determine angling pressure from May 12 through September 3, 1979. The schedule involved four hourly counts on every weekend day and holiday and on 2 weekdays per week from May 12 to July 31, covering the hours from 6 a.m. to 12 midnight. From August 1 to September 3, three hourly counts were made from 6 a.m. to 7 p.m. because of fewer hours of daylight.

Hourly counts were made by boat from a central location on the lake so that all anglers were visible.

The pressure estimate for the season was 24,024 angler hours (Table 3). This represents a 50% increase in pressure from the estimate of 15,970 angler hours in 1978 (Peckham, 1979). Sixty percent of the estimated pressure occurred on weekends and holidays.

Anglers returning to the boat landing during the sampling period were interviewed to determine catch success for completed trips. During the season a total of 537 anglers contacted fished 1,380 hours and caught (and kept) 1,920 coho salmon and 12 rainbow trout. The catch rate for fish kept was 1.39 coho salmon per hour and 0.01 rainbow trout per hour (Table 4). The catch rate for coho salmon was up from the 1.03 fish per hour recorded in 1978, while the catch rate for rainbow trout declined from 0.04. Shore anglers comprised only 6.5% of those contacted and had a lower catch rate of 0.25 coho salmon per hour.

The expanded total harvest based on the pressure and catch rate estimates was 33,393 coho salmon and 240 rainbow trout. This compares to estimates in 1978 of 16,449 coho salmon and 639 rainbow trout harvested. The mean length of coho salmon and rainbow trout sampled from the harvest during the 1979 season was 253 mm and 484 mm, respectively.

George Lake:

George Lake, located about 40 miles east of Delta Junction, continues to be the most heavily utilized northern pike fishery in the Delta area. Civilian and military anglers from the Delta and Fairbanks area are the principal users.

The Tanana River isolates this 4,500 acre lake from the Alaska Highway, making it accessible only by riverboat or float plane. Float plane use is presently light. Fishing pressure is heaviest from breakup (usually near the first of June) until mid-July.

In recent years about 90% of the people fishing George Lake launched their own boats at George Lake Lodge near Mile 1385 Alaska Highway or were transported by the lodge owner. Most of the remaining anglers launched at a landing about 15 miles downstream on the Tanana River.

The use of a questionnaire, initiated in 1976, was again utilized to provide angler use and success information. People launching boats or being transported from the private landing at George Lake Lodge were given a questionnaire and asked to return the completed form at the end of their trip. Information obtained is summarized in Table 5. The response from 31 parties (92 anglers) represents a 34% return of questionnaires and about

Table 3. Quartz Lake angler pressure estimates, May 12 - September 3, 1979.

Month	Weekdays Estimated Angler Hours	Percent of Total	Weekends and Holidays Estimated Angler Hours	Percent of Total	Total
May 12-July 31 (6 a.m. to midnight)	8,368	40	12,483	60	20,851
August 1-September 3 (6 a.m. - 7 p.m.)	1,146	36	2,027	64	3,173
Totals	9,514	40	14,510	60	24,024

Table 4. Quartz Lake creel census summary, May 12 to September 3, 1979.

	Anglers Contacted	Total Hrs Fished	Total SS Kept	Total SS Released and Kept	Total RT Kept	SS per Hour	RT per Hour	Total* Fish/ Hour	Hours per Angler
<u>May</u>									
Shore	2	2	0	0	0	0	0	0	1.0
Boat	68	207	125	133	5	0.60	0.02	0.63	3.0
Both	70	209	125	133	5	0.60	0.02	0.63	3.0
<u>June</u>									
Shore	22	68	22	22	0	0.32	0	0.32	3.0
Boat	131	290	547	618	2	1.89	0.01	1.89	2.2
Both	153	358	569	640	2	1.59	0.01	1.59	2.3
<u>July</u>									
Shore	7	13	0	0	0	0	0	0	1.9
Boat	235	596	1,108	1,256	5	1.86	0.01	1.87	2.5
Both	242	609	1,108	1,256	5	1.82	0.01	1.83	2.5
<u>August & September</u>									
Shore	4	5	0	0	0	0	0	0	1.3
Boat	68	199	118	118	0	0.59	0	0.59	2.9
Both	72	204	118	118	0	0.58	0	0.58	2.8
<u>Totals</u>									
Shore	35	88	22	22	0	.25	0	0.25	2.5
Boat	502	1,292	1,898	2,125	12	1.47	0.01	1.48	2.6
Both	537	1,380	1,920	2,147	12	1.39	0.01	1.40	2.6

* Includes only fish kept.

Table 5. Angler use and northern pike harvest from 31 questionnaire responses, George Lake, 1979.

Month	Total Anglers	Average People per Party	Total NP Caught	Total NP Kept	Average Length of Stay (days)	Fish Kept/ Angler
Late May and June	64	3.6	1,208	343	2.3	5.4
July	19	2.4	280	109	1.9	5.7
August	<u>9</u>	<u>1.8</u>	<u>56</u>	<u>16</u>	<u>2.6</u>	<u>1.8</u>
	92		1,544	468		
Seasonal Averages		3.0			2.2	5.1

30% of the estimated total use for the 3-month period. Expanding the reported harvest of 468 northern pike to cover the estimated total number of anglers fishing George Lake during the period provides an estimated total northern pike harvest of 1,558. Estimated angler days totaled 673. Both pressure and harvest estimates are the lowest recorded in the past 4 years. The estimated pressure is a decrease of 35% from 1978 and the northern pike harvest is a decrease of 18% from 1978. A comparison of pressure and harvest estimates for 1976-1979 is presented in Table 6.

Tanana River:

An early spring fishery for grayling and round whitefish occurs annually on the Tanana River near Big Delta. Virtually all of the sport fishing is done in approximately 1 1/4 mi of river adjacent to the Richardson Highway bridge. The fishery normally begins the last week of March and continues until the Tanana River becomes silty from increasing flows about the third week of April.

The fishery was monitored using a stratified sampling schedule beginning on April 11 and continuing through April 25, at which time the silt load in the river precluded further fishing effort. Five hourly counts were made on 10 of the 15 days during the period, including each of the 4 weekend days, and were stratified to cover hours between 8 a.m. and 8 p.m.

An estimated total of 1,029 angler hours of effort was expended during the 15-day period sampled. Although some angling did occur prior to the April 11 starting date, observed use was comparatively light.

During the count periods an effort was made to interview as many anglers as possible who had completed their trips. When contacts for completed trips were not possible, contacts for incomplete trips were made. A summary of harvest data is presented in Table 7. A total of 94 anglers contacted fished 207 hours and caught 114 fish, keeping 67 grayling and 22 round whitefish. The catch rate for fish kept was 0.32 grayling per hour and 0.10 round whitefish per hour.

Total estimated harvest of grayling and round whitefish for the period, based on catch rates for completed trips, was 309 and 134 respectively.

Frequency of Age and lengths of 56 grayling sampled from creels are shown in Table 8. Length range was 203-365 mm with a mean of 266 mm. Age Class V was predominant, comprising 61% of the grayling creeled.

Twenty round whitefish sampled from creels had a length range of 250-405 mm and a mean length of 326 mm.

A similar sampling schedule was set up for the spring grayling fishery at Shaw Creek; however, no fishery of consequence developed. Rerouting of the Richardson Highway in 1976 altered the Tanana River below Shaw Creek, eliminating a pool which in the past attracted grayling for a period of 2 to 3 weeks prior to breakup on Shaw Creek. This concentration of grayling was vulnerable to sport fishing and received moderate to heavy pressure in past years. Since the highway reconstruction, the concentration of grayling and resulting sport fishery have not occurred.

Table 6. Summary of estimated pressure and Northern pike harvest,
George Lake, 1976-1979.

Year	Total Angler Days	Total Northern Pike Harvested	Northern Pike Kept per Angler
1976	748	1,700	5.0
1977	840	2,072	5.2
1978	1,036	1,890	4.2
1979	673	1,558	5.1

Table 7. Tanana River creel census summary, April 11-25, 1979.

	Completed Trips	Incomplete Trips	Combined Complete and Incomplete
Anglers contacted	72	22	94
Total Hours Fished	153	54	207
Total fish Kept	66	23	89
Grayling	46	21	67
Round whitefish	20	2	22
Total Fish Released	10	15	25
Total Fish Caught	76	38	114
Fish Kept/Angler	0.92	1.05	0.95
Grayling	0.64	0.95	0.71
Round whitefish	0.28	0.09	0.23
Fish Caught/Angler	1.1	1.7	1.2
Fish Caught/Hour	0.52	0.68	0.54
Fish Kept/Hour	0.44	0.42	0.43
Grayling	0.30	0.38	0.32
Round whitefish	0.13	0.04	0.10

Table 8. Age frequency and length of Arctic grayling sport harvest from the Tanana River, April 11-25, 1979.

Age Class	Number	Percent	Length (mm)	
			Range	Mean
III	5	9	203-236	214
IV	6	11	214-270	252
V	34	61	230-300	262
VI	8	14	269-308	297
VII	2	3	318-336	327
VIII	<u>1</u>	<u>2</u>	365	
	56	100	203-365	266

Goodpaster River Studies

The upper 54 miles of the Eisenmenger Fork and North Fork of the Goodpaster River was surveyed during June 25 to June 28. Due to the remoteness of the area, a two-man crew was transported by helicopter to the Eisenmenger Fork where the 4-day float by rubber raft began.

At the starting point the river is fast flowing, with few pools and a mean width of about 16 feet. Six major tributaries enter between the starting point about 1.9 miles below Boulder Creek and Central Creek. Near Central Creek the river is much slower with a greater frequency of pools and a mean width of about 60 feet.

Arctic grayling were captured with fly fishing gear, measured to fork length, and a scale sample was taken.

A total of 63 grayling captured ranged in length from 256-414 mm with a mean of 353 mm.

Five age classes from Age V to IX were present in the sample. Age Class VII was most abundant, comprising 36% of the sample, followed by Age VIII with 29%. A summary of age and length data is presented in Table 9.

Extensive studies of the Goodpaster River were conducted by Tack in 1973 (Tack, 1974). He noted a stratification of the grayling population, with predominately large fish found in the upper river. A sample of 699 grayling from June, July, and August 1973, had a mean length of 335 mm, as compared to a mean length of 353 mm (n=63) in 1979.

A wider range of age groups, from IV to XII were sampled by Tack in 1973, but the predominant age group was VII and comprised the same percentage of the sample as in 1979.

Shaw Creek Studies

Grayling, having overwintered in the Tanana River, enter Shaw Creek during spring breakup, which usually occurs during the last 10 days of April. On April 30, 1979, Shaw Creek was flowing although anchor ice was still present. Water temperature was 33°F.

The total stream length, although difficult to accurately measure, is estimated at over 60 miles. In addition there are nine named tributary streams. Riverboat access is limited to about the lower 9 miles, due to a large number of fallen trees above the point.

Rapids Creek, a tributary to Shaw Creek, located approximately 30 miles upstream from its mouth, was investigated in May. Observations were made from its confluence with Shaw Creek to near its origin, a distance of about 8 miles. The lower 4 miles had an average width of about 10 ft and contained numerous deadfalls and beaver dams. Spawning grayling were observed in this lower 4 mile section on May 17 and 18. No grayling were seen in the upper reaches. Beaver dams at some point downstream may have been a block to upstream migration.

Table 9. Age frequency and length of Arctic grayling from the upper Goodpaster River, June 25-28, 1979.

Age Class	Number	Percent	Length (mm)	
			Range	Mean
V	6	10	256-299	281
VI	11	17	295-360	320
VII	23	36	326-360	359
VIII	18	29	346-414	379
IX	<u>5</u>	<u>8</u>	<u>368-414</u>	<u>395</u>
	63	100	256-414	353

Spawning was observed over sandy-silt bottom and organic debris, usually in flowing water just below beaver dams on the same dates. Water temperature was recorded at 53°F at 11:30 a.m. and 54°F at 10:30 p.m. Shaw Creek at the same time had a temperature of 37°F and no grayling were seen or captured in Shaw Creek other than at the mouth of Rapids Creek.

Of 22 grayling captured by hook and line sampling, three were ripe females ranging in length from 258-315 mm with a mean of 279 mm and four were ripe males ranging in length from 285-328 mm with a mean of 306 mm. The total sample had a length range of 205-355 mm and had a mean of 280 mm. All were tagged and released.

Grayling in Age Classes V and VI comprised 41% and 27% of the sample, respectively. Age composition and sizes are summarized in Table 10.

Fish population samples were collected from lower Shaw Creek and Caribou Creek in September during fall out-migration.

Caribou Creek has an average width of 8 ft and depth of 2 ft, is slow flowing, and has a silt bottom. A small downstream weir was installed on lower Caribou Creek on September 10 and was operated until September 14. Clogging of the weir by leaves was a constant problem, causing some undercutting. However, a total of 207 fish including eight species was captured (Table 11). A total of 50 grayling was captured, including 11 over 200 mm which were tagged. Age and length composition of the grayling is presented in Table 12. Age Class I comprised 66% of the sample.

Water temperature during the week of September 10-14 ranged from 42 to 45°F in both Caribou and Shaw Creeks. Grayling were sampled in Shaw Creek by hook and line periodically from September 11 to October 1. One hundred grayling ranging from 178-338 mm in length with a mean of 258 mm were sampled. All but three grayling less than 200 mm were tagged and released. A summary of age and length composition is shown in Table 13. Age Class IV comprised 43% while Age Class III comprised 29%.

Remote Lake Surveys

Nine remote lakes located south of Northway in the Nabesna, Chisana, and White River drainages were surveyed in 1979. The lakes ranged in size from 96 to 2,752 surface acres and had maximum depths ranging from 11 to 100 ft. Elevations ranged from 2,031 to 3,180 ft. A summary of lake characteristics is presented in Table 14.

The lakes are all within areas affected by the Administration National Monument Proclamation and Federal Land Policy Management Act (FLPMA) which has designated some areas as National Monuments and includes other areas in the proposed National Park System or proposed National Wildlife Refuge System.

All of the lakes surveyed were found to contain fish; a total of eight species was sampled. Only one, "GAP" Lake, contained lake trout, four contained grayling and five were found to have northern pike. The best northern pike population, according to netting results, was found in Wellesley Lake #2, where 22 fish had a mean length of 627 mm and a mean weight of 2.38 kg. Netting results are summarized in Table 15.

Table 10. Age frequency and length of Arctic grayling, Rapids Creek,
May 17 and 18, 1979.

Age Class	Number	Percent	Length (mm)	
			Range	Mean
III	1	5	205	
IV	2	9	235-242	239
V	9	41	230-300	260
VI	6	27	268-326	301
VII	3	13	320-328	324
VIII	<u>1</u>	<u>5</u>	<u>355</u>	
	22	100	205-355	280

Table 11. Summary of fish captured in a downstream weir at Caribou Creek
September 11-14, 1979.

Species	Number	Percent	Length (mm)	
			Range	Mean
Arctic grayling	50	24.2	98-262	164
Humpback whitefish	48	23.2	130-333	223
Round whitefish	12	5.8	135-254	212
Northern pike	1	0.5	216	
Silver salmon	3	1.4	87-99	94
Longnose sucker	48	23.2	91-182	140
Lake chub	9	4.3	108-140	120
Slimy sculpin	<u>36</u>	<u>17.4</u>	<u>88-152</u>	<u>.....</u>
	207	100		

Table 12. Age frequency and length of Arctic grayling, Caribou Creek,
September 11-14, 1979.

Age Class	Number	Percent	Length (mm)	
			Range	Mean
0	3	6	98-102	100
I	33	66	128-178	150
II	6	12	173-206	196
III	5	10	205-224	212
IV	2	4	229-250	240
V	<u>1</u>	2	<u>262</u>	
	50		98-262	164

Table 13. Age frequency and length of Arctic grayling, Shaw Creek,
September 11 - October 1, 1979.

Age Class	Number	Percent	Length (mm)	
			Range	Mean
II	4	4	187-214	204
III	29	29	178-254	222
IV	43	43	224-298	268
V	18	18	246-316	287
VI	4	4	296-309	302
VII	<u>2</u>	2	<u>320-338</u>	<u>329</u>
	100		178-338	258

Table 14. Comparison of lake characteristics of nine remote area lakes, Interior Alaska, 1979.

Lake and Location	Surface Acres	Elevation	Maximum Depth (feet)	pH	Total Alkalinity (ppm)	Total Hardness (ppm)
Carden 62°17'N, 141°18'W	806	2,635	11	7.7		34
Fern 62°42'N, 142°18'W	96	2,350	100	8.0	86	51
"GAP" 62°17'N, 141°18'W	237	3,180	85	8.5	68	51
Gillam 62°26'N, 142°58'W	96	2,430	43	9.0	171	137
Jatahmund 62°37'N, 142°00'W	2,752	2,171	78	8.5	68	34
Jimmie Brown 62°29'N, 142°35'W	147	2,170	18	9.0	103	103
Takomahto 62°37'N, 141°56'W	576	2,167	85	7.5	68	34
Wellesley #1 62°25'N, 141°20'W	301	2,060	90	7.5	34	34
Wellesley #2 62°31'N, 141°15'W	973	2,031	78			

Table 15. Fish sampling summary for nine remote lakes in the Northway area June 13 to July 26, 1979.

Lake	Species	Number	Length (mm)		Weight (kg)		Fish Per Net Hour
			Range	Mean	Range	Mean	
Carden	GR	17	270-348	314	0.20-0.54	0.36	1.0
Fern	GR	6	130-276	202			0.17
	LNS	4	220-240	225			0.17
"GAP"	GR	10	230-368	264	0.15-0.60	0.24	0.45
	LT	23	240-332	298	0.17-0.42	0.33	1.05
Gillam	GR	25	120-140				1.04
	GR	15	220-267	253	0.10-0.20	0.16	0.63
	LNS	57	210-356				2.38
Jatahmund (Swan)	NP	4	414-662	535			0.09
Jimmie Brown	NP	5	560-624	596	1.25-1.82	1.54	0.19
	RWF	1	344		0.45		0.04
Takomahto (Floyd)	NP	5	424-815	599	0.57-4.43	1.91	0.22
	LCI	7	122-132				
Wellesley #1	NP	2	735-803	769	2.50-2.95	2.72	0.07
	HWF	1	432		1.63		0.03
	LCI	15	216-320	288	0.09-0.45	0.33	0.52
	BB*	1	800		2.50		
Wellesley #2	NP	22	356-913	627	0.34-6.92	2.38	0.51
	HWF	7	382-431	414	0.71-1.22	0.98	0.16
	LCI	181	120-327	260			4.21

* Caught by hook and line

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